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Credit risk management, ESG, and bank performance: Survey evidence on mediating and moderating effects from Vietnam

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ABSTRACT

Although the link between credit risk management (CRM) and bank performance is well documented, the mediating role of CRM and the moderating role of Environmental, Social, and Governance (ESG) practices remain underexplored in emerging-market banking. Drawing on agency theory and stakeholder theory, this study develops an integrated model in which five determinants (organizational structure, operational efficiency, environmental risk, credit appraisal measurement, and market risk analysis) shape CRM, which, in turn, transmits their effects to bank performance, with ESG practices as a boundary condition. The model was tested using partial least squares structural equation modeling (PLS-SEM) on survey data collected from 311 banking professionals at Vietnamese commercial banks. The results show that all five determinants positively and significantly influence CRM, and the model explains a substantial share of the variance in CRM and bank performance. CRM significantly mediates the effects of the five determinants on performance, whereas its direct effect on performance is statistically significant but practically negligible. ESG practices positively moderate the CRM–performance relationship, indicating that ESG integration amplifies the performance payoff of credit risk management. The findings suggest that Vietnamese bank managers should strengthen operational efficiency and embed ESG criteria in credit processes, while regulators should reinforce ESG disclosure and green-credit frameworks to support a sustainable financial service distribution system.

Contribution/Originality: This paper contributes to the literature by proposing an integrated model that links determinants, including organizational and operational factors, to credit risk management. The study examines the mediating role of credit risk management and the moderating role of ESG practices, using a PLS-SEM framework based on a survey conducted in Vietnam.

1. INTRODUCTION

Commercial banks play a critical role as distribution institutions for financial services, providing products to customers through branch networks and digital channels. In this study, "distribution performance" refers to the effectiveness with which a bank delivers financial products and services to customers, reflected in service delivery quality, customer access to credit products, and the efficiency of its distribution channels, and corresponds to the bank performance construct operationalized in the research model. The efficiency of financial service distribution systems is impacted by risk management in banking operations, particularly for lending activities. Credit risk management is the most significant influence on the stability and distribution capacity of banking systems (Basel Committee on

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Banking Supervision, 2000; Bhatt, Ahmed, Iqbal, & Ullah, 2023). In addition, banks cannot maintain or expand financial products and services to improve performance without effective CRM (Ogilo, 2012).

Vietnam offers a particularly relevant setting for this inquiry. The Vietnamese banking system comprises a large network of state-owned and joint-stock commercial banks whose credit supply remains the dominant financing channel of the economy, and the sector has recorded sustained double-digit credit growth over the past decade. At the same time, the State Bank of Vietnam has been tightening the regulatory environment, notably through the phased adoption of Basel II capital and risk-management standards and the requirement to manage environmental risks in credit-granting activities. Rapid credit expansion, accelerating digitalization of distribution channels, and persistent concerns about non-performing loans make effective credit risk management and ESG integration pressing strategic issues for Vietnamese banks.

External factors are playing an increasing role in lending and CRM. Additionally, climate change and environmental degradation adversely affect interest rates, currencies, and equity prices by reducing repayment capacity and creditworthiness (Ramdhonah, Kurniawati, & Machmud, 2017). Therefore, analyzing changes in macroeconomic conditions and other factors, such as the environment, can improve customer assessment in banks' credit activities (Fazal, Gulzar, & Naz, 2025). In addition, the internal operational structure of a bank, which includes transaction implementation, resource allocation, and the accuracy of loan evaluation and tracking, is equally significant in mitigating credit risk exposure (Murtaza, Ansari, ul Hassan, & Akhtar, 2023). Additionally, credit appraisal practices indicate the quality of credit decisions at the point of origination (Bhatt et al., 2023).

Meanwhile, Environmental, Social, and Governance (ESG) factors have become important aspects of corporate strategy and financial performance assessment (Galletta, Goodell, Mazzù, & Paltrinieri, 2023). Although research on ESG has primarily focused on non-financial firms, an increasing body of literature indicates that ESG integration positively affects business strength and, more broadly, financial performance (Friede, Busch, & Bassen, 2015). ESG practices in the banking sector can strengthen risk governance and align institutional incentives with long-term sustainability objectives. However, the moderating role of ESG in the relationship between CRM and bank performance has not been adequately explored in the literature, particularly in emerging markets.

Even with this literature, three major issues in the financial service distribution context remain. First, existing studies on the determinants of CRM, mostly from Nepal (Bhatt et al., 2023), Ethiopia (Getahun, Anwen, & Bari, 2015), and Pakistan (Murtaza et al., 2023), examine the determinants separately and in isolation, and few studies explicitly connect these determinants with distribution performance measures, such as service delivery quality and customer access. In addition, rapid credit expansion and the digitalization of banking services and distribution channels affect the distribution system for banking services and products, which can impact bank performance. Studies focusing on CRM as a link between the organizational level and the distribution effectiveness of financial service providers are rare. Moreover, ESG serves a balancing function that makes CRM more effective, as well as supporting the distribution of the financial system.

Accordingly, this study addresses three research questions: (RQ1) Which organizational, operational, and market-related factors significantly influence credit risk management in Vietnamese commercial banks? (RQ2) Does credit risk management mediate the relationship between these determinants and bank performance? (RQ3) Do ESG practices moderate the relationship between credit risk management and bank performance?

The structure of the paper is as follows. Section 2 reviews the literature and proposes the hypotheses. Section 3 discusses the research methodology. Section 4 presents the empirical results. Section 5 presents the implications, practical recommendations, and directions for future research.

2. LITERATURE REVIEW

This research is primarily theoretical, using agency theory. Agency theory was formulated by Jensen and Meckling (1976) to explain conflicts of interest that emerge from the separation of ownership and control. The

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potential harm is that managers (agents) may pursue their own interests to the detriment of shareholders (principals). The principal-agent problem is particularly acute in the banking industry: bank managers make lending decisions that directly affect bank value, but they may have incentives to take on risk instead (Laeven & Levine, 2009). CRM frameworks might accordingly be considered governance structures designed to redirect managerial action towards shareholders and depositors through systematic controls on credit decisions, monitoring, and reporting.

Stakeholder Theory is also a basis for this work, and it provides the inspiration for its ESG role. Freeman (1984) declares that "business adds value to society not only by creating shareholder value but also through its relationships with other stakeholders, including employees, customers, communities, and regulators." For banks, including ESG in risk management reflects a commitment to stakeholders' interests and mitigates reputational and regulatory risks, thereby enhancing CRM's success in driving long-term financial performance. Combined, agency theory and stakeholder theory help explain why internal governance arrangements, operational practices, and ESG orientation collectively contribute to the quality of risk management and bank performance outcomes.

Exogenous factors significantly affect how banks respond to risk management (Boyd & De Nicoló, 2005). Risk management, as such, is a general concept that entails the detection and quantification, reduction, and response to possible risks before and after their occurrence (Van Greuning & Brajovic Bratanovic, 2020). The general objective is to develop a systematic understanding of risk to reduce it. Internal rating structures and profit-margin adjustments across risk levels require solid information-system infrastructure and the proper functioning of branch networks to support banks seeking to maintain the flexibility of effective risk-management practices. In this light, the current study seeks to undertake a comprehensive exploration of both internal and external factors in credit-risk management.

The environmental aspect has become more important in credit risk. Environmentally harmful practices undertaken by borrowers can result in substantial financial strain because operating costs rise and income sources shrink, which can ultimately affect their capacity to repay loans (Murtaza et al., 2023). Long-term weather changes and extreme weather events can further intensify these risks. From an agency-theory perspective, incorporating formal environmental risk screening into credit assessment acts as a monitoring mechanism that constrains discretionary lending to environmentally risky borrowers and thereby protects the interests of shareholders and depositors. According to this reasoning, the hypothesis is as follows:

H_1: Environmental risk assessment positively impacts commercial banks' credit risk management.

Additionally, a better organizational structure in the banking sector could improve credit risk management and governance within the banking system (Al-Ardah & Al-Okdeh, 2022). Equally, organizational structure greatly influences credit risk management processes in emerging markets (Aebi, Sabato, & Schmid, 2012). Managing credit risk requires task delegation, effective communication, and timely judgment (Islam, Alam, & Hossain, 2019). Credit risk management and organizational performance are inseparable (Rehman, Benamraoui, & Dad, 2018), and organizational structure shapes bank risk-taking behavior (Roy, 2008). Agency theory suggests that clear lines of authority and accountability reduce information asymmetry between the board (principal) and lending managers (agents), thereby strengthening credit risk governance. Therefore, the second hypothesis is:

H_2: Organizational structure is positively related to credit risk management.

Bank performance is a useful predictor of credit risk management outcomes (Saeed & Donkoh, 2026). With effective financial operations, institutions may improve their ability to handle challenges and mitigate risk exposure by optimizing processes or strategically adopting technology. The positive impacts of operationally sound banking include regulatory compliance, reduced costs, improved customer experience, and enhanced risk oversight, among others (Murtaza et al., 2023). This indicates that stronger operational foundations lead to a greater ability to handle and respond to credit-related risks. In agency-theoretic terms, efficient operations lower the monitoring costs of credit control and improve the quality of information available for managerial oversight.

H_3: Operational efficiency positively impacts credit risk management.

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Credit assessment plays a pivotal role in outlining the conditions under which lending relationships are formed. It is widely perceived as the evaluation of a borrower's financial status and underlying risk profile, including character, capacity, capital, and conditions, before loans are issued (Bhatt et al., 2023). This is a relatively simple assessment, depending on the size and type of credit facility (Saeed & Donkoh, 2026). Rigorous credit appraisal is a core control device through which principals discipline lending decisions at origination, consistent with agency theory.

H_4: Credit appraisal measurement has a positive effect on credit risk management.

Market risk is one of the many risks associated with banking and arises from changes in interest rates, equity prices, foreign exchange rates, and commodity prices (Al-Tamimi & Al-Mazrooei, 2007). Market conditions are dynamic and can directly influence a bank's risk exposure and strategic positioning (Bessler & Kurmann, 2014). Accurately determining the cost of capital across various sources of funds underpins both operational sustainability and market risk management. By maintaining market risk at manageable levels, banks will have a better understanding of variations in related variables, thereby boosting their ability to manage credit risk. Systematic market risk analysis likewise serves as an information and monitoring mechanism that aligns managerial risk-taking with the bank's approved risk appetite.

H_5: Market risk analysis positively impacts credit risk management.

A growing body of literature has explored the relationship between credit risk and bank financial performance. Strong correlations between the two have been consistently documented (Cheng & Qu, 2020), with studies across various national contexts reinforcing the view that effective risk management drives profitability (Kolapo, Ayeni, & Oke, 2012). Further, technological advancement in banking facilitates this connection, leading to faster decisions and lower costs associated with credit risk control (Bhatt et al., 2023). Based on internal banking practices in asset valuation and borrower assessment, evidence indicates that incorporating credit risk insights into institutional frameworks, policies, and governance enables banks to set appropriate risk capacity levels and manage exposure according to market conditions (Pradhan & Shah, 2019). Agency theory implies that such institutionalized CRM frameworks reduce the agency costs of lending and should therefore translate into stronger bank performance.

H_6: Credit risk management is positively correlated with bank performance.

The broader credit risk management literature identifies a constellation of contributory factors beyond credit scoring per se. There is a risk of adverse events and exposure to losses resulting from adverse market conditions or borrower defaults (Altman & Saunders, 1997) and structural factors such as governance systems, risk culture, and loan issuance (Bhatt et al., 2023). A quality credit risk structure representing strategy, rating setup, and control measures has been found to support robust system-level performance (Kumar, Arora, & Lahille, 2011). Environmental risk and the quality of credit appraisal have likewise emerged as material determinants of credit risk performance (Bhatt et al., 2023), especially amid intensifying ecological issues and rapid economic growth. Tight credit risk evaluation models can ultimately protect profitability by decreasing the rate of losses, a conclusion mirrored in country-specific research showing that credit risk management is closely linked to commercial bank performance (Getahun et al., 2015). Based on agency theory, CRM is thus the governance conduit through which organizational, operational, and market-related controls affect performance outcomes. On this basis, the hypothesis below is proposed.

H_7: Credit risk management (CRM) mediates between factors affecting CRM and bank performance.

As Buallay (2019) notes, environmental, social, and corporate governance (ESG) performance has become increasingly imperative for banks and other financial entities. An increasing number of financial intermediaries are incorporating ESG activities into their business models. Integrating ESG into risk management and credit policies is not only prudent but also a critical measure for banks and state authorities. Previous studies also suggest that, because these are more environmentally conscious businesses, ESG is more relevant to sensitive industries. Since they are more likely to negatively impact stakeholders, firms in sensitive categories are often better off focusing on ESG to protect their image (Garcia, Mendes-Da-Silva, & Orsato, 2017).

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Recent research highlighting the connection between finance and ESG in sustainability reports supports ESG disclosure (Adams, 2017). ESG also has a moderating role in several other relationships. For example, according to Ahmad, Mobarek, and Roni (2021) and Ananzeh, Khalifeh, Alqudah, Al-Ababneh, and Al Amosh (2025), ESG moderates the associations between dividend policy and cash holdings, the GFC, and company financial performance. However, Elamer and Boulhaga (2024) were unable to corroborate ESG's moderating role in the association between controversies and financial performance. There is limited research on the banking and financial services industry, despite the rising interest in ESG (Galletta, Mazzù, & Naciti, 2022). Additionally, the moderating role of ESG in the relationship between bank performance and credit risk management remains unclear. In financial services specifically, ESG integration can strengthen the CRM–performance link through several channels: it enriches the information set used in borrower screening (e.g., environmental and social risk indicators), reduces exposure to reputational and litigation risks associated with financed activities, and improves access to sustainability-oriented funding and customer segments (Buallay, 2019; Galletta et al., 2023). From a stakeholder-theory perspective, ESG practices signal a credible commitment to the interests of customers, employees, regulators, and the wider community; this commitment mitigates reputational and regulatory risks and should therefore amplify the performance payoff of sound credit risk management in financial services. Therefore, the author proposes the following hypothesis:

H_8: ESG (Environmental, Social, and Governance) moderates the relationship between credit risk management and bank performance.

3. METHODOLOGY

3.1. Research Design and Data Collection

Data were collected through a structured questionnaire administered to banking professionals directly involved in credit operations and risk management at Vietnamese commercial banks. The questionnaires were distributed on paper; 311 valid responses were retained for analysis, corresponding to a response rate of 88%. Perceptual measures were adopted for all constructs because the phenomena of interest, internal risk governance quality, organizational arrangements, appraisal practices, and ESG integration, are internal processes and managerial practices that are not directly observable in published financial statements; informed insiders are therefore the most appropriate source of such data, an approach consistent with prior banking risk-management research (Abu Hussain & Al-Ajmi, 2012; Al-Tamimi & Al-Mazrooei, 2007; Bhatt et al., 2023). Perceptual performance measures may diverge from accounting-based outcomes, and future research should triangulate survey evidence with archival indicators such as ROA, ROE, and non-performing loan ratios.

3.2. Measurement of Variables

Multi-item scales from the existing literature were selected and adapted into a multi-item scale to operationalize all constructs under study, ensuring sufficient content validity across measures. Credit risk management (CRM) has been interpreted as an organized way of dealing with uncertainty, in which potential risks are identified, mitigation strategies are created, and resources are mobilized to minimize negative effects. This includes the identification, quantification, monitoring, and containment of risks linked to potential loan defaults (Kalu, Shieler, & Amu, 2018).

Environmental risk (ER) comprises three intimately connected dimensions: direct risk, exposure to environmental remediation liability; indirect risk, exposure to borrowers' negative environmental impacts; and reputational risk, associated with environmentally hazardous operations (Abubakar, Abubakar, Baba, & Katagum, 2024).

Credit appraisal measurement (CAM) is a formal assessment of the commercial, financial, and technical feasibility of a proposed project, as well as its financing structure and the sufficiency of available collateral/security to recover the loan (Bhatt et al., 2023). MRA evaluates potential losses in an investment portfolio due to fluctuations in market prices, covering interest-rate, foreign-exchange, equity, and commodity-risk dimensions (Al-Tamimi & Al-Mazrooei,

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2007). Operational efficiency (OE) reflects the optimization of a bank's operations through two primary mechanisms: configuring outputs to capitalize on economies of scale and scope, and managing inputs to avoid overconsumption or disproportionate resource allocation (Allen & Rai, 1996), while organizational structure (OS) describes the framework through which an institution's functions are segmented, arranged, and administered to support coordinated and effective operations. Bank performance (PCB) is assessed through the lenses of cost and profit efficiency, with profitability serving as a key indicator of the institution's overall success (Athanasoglou, Brissimis, & Delis, 2008).

Lastly, the Environmental, Social, and Governance construct (ESG) encompasses a collection of standards assessing the organization's activities based on three dimensions: the Environmental dimension includes such aspects as preventing pollution, conserving biodiversity, and integrating renewable energy; the Social dimension deals with health and safety, equal employment opportunity, and labor relations; and the Governance dimension examines such factors as board diversity, management transparency, and the protection of shareholder rights (Chen, Kuo, & Chen, 2022).

Although ESG is conceptually multidimensional, it was modeled as a first-order reflective construct in this study because the number of retained items per dimension (two to three) is insufficient to identify a stable second-order structure (see Table 1). We acknowledge that a second-order specification with Environmental, Social, and Governance as lower-order dimensions would be preferable with a richer item set, and we recommend this approach for future research. Item redundancy was additionally examined through inter-item correlation analysis; no pair of items exhibited correlations high enough to indicate substantive redundancy.

Table 1. Measurement items for the constructs

No.	Credit Risk Management	Reference
1	Senior management successfully translates and communicates the credit risk framework established by the board into concrete operational policies and procedural guidelines across the institution.	Al-Tamimi and Al-Mazrooei (2007)
2	The bank establishes a practical risk management framework (Processes, rules, and infrastructure) to control credit risk.	
3	All credit activities are evaluated in accordance with the bank's credit risk framework.	
4	The institution conducts ongoing surveillance of the quality of its credit portfolio and initiates appropriate remedial measures whenever signs of decline are detected.	
	Measuring Environmental Risk	
1	The bank assesses borrowers' exposure to environmental liabilities, including cleanup responsibilities and pollution-related risks, as part of the credit evaluation process.	Abubakar et al. (2024)
2	The bank evaluates the potential indirect environmental consequences of financed projects, such as ecosystem damage or community health impacts.	
3	The bank considers reputational risks arising from financing activities that may be associated with environmentally harmful operations.	
4	The bank incorporates climate-related risks, including carbon emission regulations and evolving environmental laws, into its credit risk assessment framework.	
	Measuring Credit Appraisal Management	
1	The lending unit verifies that prospective borrowers meet the required eligibility criteria as part of the loan review process.	Makori (2015)
2	Collateral assets pledged by borrowers are subject to periodic examination by the lending unit throughout the credit evaluation period.	
3	The borrower's capacity to repay is consistently considered by the lending unit before any loan approval decision is made.	
4	The lending unit routinely verifies the source and reliability of a borrower's income during the credit assessment process.	
	Measuring Market Risk Analysis	

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No.	Credit Risk Management	Reference
1	The Board of Directors' market risk strategy is successfully conveyed and disseminated by senior management through the bank's policies and procedures.	Alali and Haddad (2023) and Al-Tamimi and Al-Mazrooei (2007)
2	Banks have an efficient risk management framework (Infrastructure, procedures, and regulations) in place to limit market risk.	
3	Total market risk is kept within appropriate bounds by the bank, in line with available capital.	
4	Financial institutions apply a diverse range of risk quantification methods to identify and measure market risk exposure across specific business activities.	
	Measuring the Performance of Commercial Banks	
1	Senior management undertakes periodic evaluations of how effectively the organization manages its risk-related responsibilities.	Abu Hussain and Al-Ajmi (2012)
2	A robust mechanism for ongoing monitoring and feedback concerning the adequacy and outcomes of risk management strategies is maintained within the institution.	
3	Formally documented risk management policies and operational procedures serve as practical guidance and reference resources for staff members.	
4	On the whole, the institution's approach to managing risk is regarded as being of a high standard.	
	Organizational structure	
1	The organizational design adequately captures and reflects the scale and intricacy of managerial operations.	Stanikzai and Mittal (2025)
2	Lines of authority and areas of accountability are explicitly and unambiguously established throughout the organization.	
3	Standardized policies and procedures governing day-to-day operations are formally documented and enforced.	
	Operational efficiency	
1	The time required to complete service delivery processes has been progressively reduced.	Curristine, Lonti, and Joumard (2007)
2	The utilization of organizational assets has improved over time.	Berger and Humphrey (1997)
3	Routine operating expenditures have been brought down through more efficient resource management.	Athanasoglou, Georgiou, and Staikouras (2009)
4	The output and effectiveness of the workforce have improved notably.	Al Yami, Ajmal, and Balasubramanian (2022)
5	The standard of service customers experience has been elevated.	
6	The overall value generated for customers through the organization's offerings has grown considerably.	
7	Routine banking activities are streamlined to reduce unnecessary complexity.	Muazu and Nashehu (2021)
8	Operational processes are structured to ensure that customer information is delivered promptly, precisely, and in a contextually appropriate manner.	
9	Customer satisfaction is upheld through the consistent and effective execution of core operational functions.	
10	All functional activities are carried out with risk exposure kept to a minimum.	
	Environmental, Social, and Governance (ESG)	
1	The Bank employs sustainable supply chains and ecologically friendly products, and it creates policies to stop the depletion of natural resources (E)	Mohanty, Priya, Paithe, and Mohanty (2025)
2	The Bank takes part in several environmental protection initiatives and social events (E)	
3	Your Bank prioritizes and consistently raises worker job satisfaction (S)	
4	Your Bank offers exceptional assistance with developing talent (S)	Cai, Xiang, Neskorodieva, and Durmanov (2024)
5	The bank ensures transparency and accountability in its governance practices, including clear reporting and effective oversight mechanisms. (G)	
6	Your Bank has a sustainable development business philosophy (G)	
7	The Bank's ownership/Governance structure is stable and transparent (G)	Mohanty et al. (2025)

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3.3. Data Analysis Method

The proposed hypotheses are tested using partial least squares structural equation modeling (PLS-SEM), which is especially well suited to exploratory research, complex models, and studies with latent constructs (Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014; Henseler, Ringle, & Sarstedt, 2015). PLS-SEM does not rely on strict assumptions about data normality and is suited to prediction-oriented studies.

The analysis was conducted in two phases, following the two-step method suggested by Chin (1998). The measurement model was tested to determine reliability and validity. Cronbach's alpha and composite reliability were used to assess internal consistency reliability. Convergent and discriminant validity were determined using factor loadings, average variance extracted (AVE), the Fornell-Larcker criterion, cross-loadings, and the heterotrait-monotrait ratio (HTMT) (Hair, Risher, Sarstedt, & Ringle, 2019; Henseler et al., 2015). The structural model was tested to investigate the hypothesized construct relationships. The key criteria used to evaluate the model included the path coefficient (β), coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2) to assess the model's explanatory power and predictive capability (Gim & Cheah, 2020; Purwanto & Sudargini, 2021).

To assess the risk of common method bias, Harman's single-factor test was performed. The first unrotated factor accounted for less than 50% of the variance, indicating that common method bias is unlikely to be a major concern in this study.

Finally, because the study relies on cross-sectional survey data, the PLS-SEM estimates capture associations rather than causal effects and cannot distinguish between short-term and long-term dynamics; the hypothesized directions rest on theory, and the results should be interpreted accordingly.

4. FINDINGS

The outcome of this study provides empirical evidence about the factors influencing credit risk management (CRM) and its effects on the performance of commercial banks in Vietnam. The results from a PLS-SEM analysis of 311 banking professionals generally support the theoretical framework under development but reveal some interesting differences in the magnitudes and significance of the relationships.

The measurement model was tested against the criteria suggested by Hair et al. (2019). Most indicators have factor loadings above the recommended 0.70 (Table 2). Two indicators, OS2 (0.693) and ESG3 (0.658), are marginally below this threshold; however, both exceed the lower bound of 0.60, at which retention is acceptable when composite reliability and AVE meet their thresholds (Hair et al., 2019). Their removal did not meaningfully improve the composite reliability or AVE of their constructs. The items were therefore retained to preserve content validity.

The average variance extracted (AVE) values for all estimated constructs are greater than the recommended threshold of 0.50, ranging from 0.658 (CAM) to 0.734 (PCB), indicating convergent validity. For internal consistency, composite reliability (CR) scores range from 0.856 (OS) to 0.937 (MRA), both within the desirable range of 0.60–0.95. Cronbach's alpha values are all acceptable, exceeding the 0.70 threshold; the lowest values are for CRM (α = 0.728) and OS (α = 0.726). Only the composite reliability of MRA (0.937) approaches the upper limit of 0.95, indicating possible item redundancy within that construct. Rho A values are also within reasonable ranges for all constructs. Overall, the measurement model demonstrates sufficient reliability and convergent validity, with the slight weaknesses noted above.

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Table 2. Assessment of convergent validity and reliability.

Constructs and Indicators		Convergent validity		Internal consistency reliability		
		Loadings >= 0.70	AVE >0.50	Composite Reliability 0.60 - 0.95	Cronbach's Alpha 0.60-0.95	Rho_A 0.70-0.95
Credit Risk Management (CRM)	CRM1	0.829	0.689	0.903	0.728	0.865
	CRM2	0.859				
	CRM3	0.835				
	CRM4	0.826				
Credit Appraisal Measurement (CAM)	CAM1	0.866	0.658	0.915	0.906	0.904
	CAM2	0.853				
	CAM3	0.695				
	CAM4	0.825				
Environmental Risk (ER)	ER1	0.844	0.723	0.897	0.856	0.799
	ER2	0.852				
	ER3	0.817				
	ER4	0.834				
Performance of Commercial Banks (PCB)	PCB1	0.851	0.734	0.864	0.775	0.866
	PCB2	0.843				
	PCB3	0.863				
	PCB4	0.873				
Market Risk Analysis (MRA)	MRA1	0.783	0.675	0.937	0.903	0.726
	MRA2	0.775				
	MRA3	0.756				
	MRA4	0.826				
Operational Efficiency (OE)	OE1	0.847	0.719	0.899	0.874	0.863
	OE2	0.876				
	OE3	0.881				
	OE4	0.896				
	OE5	0.868				
	OE6	0.871				
	OE7	0.839				
	OE8	0.846				
	OE9	0.849				
	OE10	0.824				
Organizational Structure (OS)	OS1	0.839	0.662	0.856	0.726	0.885
	OS2	0.693				
	OS3	0.857				
Environmental, Social, and Governance (ESG)	ESG1	0.771	0.634	0.917	0.863	0.798
	ESG2	0.830				
	ESG3	0.658				
	ESG4	0.756				
	ESG5	0.808				
	ESG6	0.845				
	ESG7	0.747				

Table 3. Discriminant validity.

Construct	CRM	ER	CAM	MRA	PCB	OE	OS	ESG
CRM	1.000	0.736	0.816	0.825	0.823	0.861	0.834	0.783
ER	0.736	1.000	0.862	0.878	0.779	0.877	0.687	0.741
CAM	0.816	0.862	1.000	0.720	0.862	0.774	0.829	0.821
MRA	0.825	0.878	0.720	1.000	0.723	0.801	0.727	0.793
PCB	0.823	0.779	0.862	0.723	1.000	0.862	0.809	0.758
OE	0.861	0.877	0.774	0.801	0.862	1.000	0.812	0.846
OS	0.834	0.687	0.829	0.727	0.809	0.812	1.000	0.832
ESG	0.783	0.741	0.821	0.793	0.758	0.846	0.832	1.000

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The heterotrait-monotrait ratio (HTMT) was used to assess discriminant validity, as suggested by Hair et al. (2019) and Henseler et al. (2015). The findings show that most HTMT values fall below the conservative threshold of 0.85, but some construct pairs warrant consideration based on Table 3. In particular, CAM–CRM (0.816) and MRA–CRM (0.825) are close to the upper limit of 0.90, indicating that these constructs may overlap conceptually with CRM. Likewise, ER–OE (0.877) and CAM–OS (0.829) show high values. Although all values are technically below the 0.90 criterion, the results indicate that these construct pairs lack clearly defined discriminant validity. Researchers are advised to interpret associations between these constructs with due caution, and future research designs could focus on improving item content to conceptually distinguish them. These elevated HTMT values warrant explicit caution: because several determinants share a common conceptual core of risk-management practice, part of the explained variance in CRM may reflect construct overlap rather than distinct causal channels, and the structural coefficients between these construct pairs should be read as upper-bound estimates.

To examine the quality of the structural model, indicators of model fit and predictive relevance are applied. The root-mean-square residual covariance (RMSθ) was used as the overall measure of model fit. The value of 0.104 is slightly above the suggested value of 0.10 (Henseler et al., 2015); therefore, the model fit is not the best, yet it is acceptable. This finding should be viewed with caution, as it indicates that the measurement model might have some remaining covariance unexplained by the identified factor structure.

The values of the coefficient of determination (R^2) for CRM (0.785) and PCB (0.787) demonstrate that the exogenous constructs jointly explain the variation in these endogenous variables (approximately 78–79 percent). Q^2, a measure of predictive relevance determined through blindfolding, had values of 0.503 and 0.589, indicating that the model has strong predictive relevance for both endogenous constructs, CRM and PCB (Hair et al., 2019). At the same time, R^2 values of approximately 0.78–0.79 are unusually high for perceptual survey data and should be interpreted critically. Because all constructs were measured with the same instrument and from the same respondents, common method variance may inflate the observed relationships despite the acceptable result from Harman's single-factor test; the explanatory power reported here should therefore be regarded as an upper bound.

Nonetheless, the predictive strength ($q^2 = 0.08$) of the CRM-to-PCB path is already within the small-to-medium range, meaning that although CRM is statistically significant in predicting bank performance, its predictive increment beyond the other modeled elements is practically insignificant.

Table 4. Summary of hypothesis testing.

Hypothesis	β-value	f^2	t-value	p-value
H1	0.109	0.060	2.276	0.007
H2	0.186	0.048	2.278	0.024
H3	0.113	0.039	3.123	0.016
H4	0.129	0.043	2.307	0.002
H5	0.106	0.041	2.595	0.000
H7 (Indirect): ER → CRM → PCB	0.015		2.119	0.043
OE → CRM → PCB	0.129		2.359	0.000
OS → CRM → PCB	0.121		2.306	0.038
CAM → CRM → PCB	0.134		2.359	0.000
MRA → CRM → PCB	0.025		3.744	0.044
H6 (Direct): CRM → PCB	0.017	0.034	2.802	0.001
H8	0.074	0.032	2.406	0.003

Table 4 summarizes the model results. All hypotheses, H1 to H5, are found to be true, and it is accepted that organizational structure (OS), operational efficiency (OE), environmental risk (ER), credit appraisal measurement (CAM), and market risk analysis (MRA) each have a statistically significant positive impact on credit risk management (CRM). However, their real-world effect sizes are small, with f^2 values ranging between 0.039 and 0.060,

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all within the small effect-size range according to Cohen (1988) conventions. This implies that these determinants are statistically significant, but they contribute only a small amount to the variance in CRM.

In the context of H7, the mediation analysis indicates that CRM plays an important role in mediating the relationships between the five antecedents and bank performance (PCB). All direct paths are statistically significant, with the strongest indirect paths being CAM to CRM to PCB ($\beta = 0.134$) and OE to CRM to PCB ($\beta = 0.129$), and the weakest being ER → CRM → PCB ($\beta = 0.015$). These results imply that the effects of organizational and operational variables on bank performance are largely channeled or mediated through the credit risk management mechanism rather than through direct channels.

In the case of H6, CRM has a statistically significant but practically negligible direct effect on PCB ($\beta = 0.017$, $p = 0.001$; $f^2 = 0.034$). Nevertheless, this coefficient is inconsequential in the real world, suggesting that credit risk management, without conditions of moderation or mediation, has little direct impact on performance levels. Of particular importance is the difference between statistical and practical significance, and this result must be viewed through the prism of a large sample size ($n = 311$), which boosts sensitivity to even trivially small effects. The corresponding effect size ($f^2 = 0.034$) confirms that the direct contribution of CRM to bank performance is small by Cohen (1988) conventions; in practical terms, CRM matters for performance chiefly through its mediating role rather than as a stand-alone direct driver.

Finally, H8 is supported, with ESG significantly moderating the CRM–PCB relationship ($\beta = 0.074$, $p = 0.003$, $f^2 = 0.032$). The positive interaction term suggests that the greater the level of ESG integration, the greater the impact of CRM on bank performance. Nevertheless, the effect size is small, indicating that ESG is a complementary, rather than revolutionary, boundary condition of this relationship. Future studies ought to determine whether ESG moderation increases in a more intense regulatory environment or under more developed sustainability disclosure policies.

Overall, most of the relationships posited by the hypothesis are significant, and, again, the effect sizes across the models are small. This trend indicates that each individual's predictive value is relatively weak and that bank performance may be shaped by other "outside" actors not captured by the existing model.

5. CONCLUSIONS

This paper aims to comprehensively analyze the role of credit risk management (CRM) in the business operations of commercial banks to enhance their distribution performance in Vietnam's commercial banking market. This study adds value to the traditional approach linking risk and performance in financial institutions by reaffirming and reestablishing the pivotal role that credit risk management (CRM) plays in enhancing the effectiveness of financial service delivery, access to credit products, and the quality of banking distribution channels. Based on an integrated model of five factors (organizational and market factors as prerequisite factors; CRM as a mediating factor; and ESG as a regulating factor), the study reveals valuable empirical findings on the factors that affect the efficiency of financial service delivery by Vietnamese commercial banks.

For Vietnamese banks operating amid rapid credit growth and a tightening prudential regime, the results show that credit risk management creates value primarily as a transmission mechanism, converting organizational and operational strengths into performance outcomes rather than serving as a stand-alone performance driver. Equally important, ESG integration is not merely a compliance exercise; it is a strategic complement that amplifies the payoff from risk management. Banks that treat ESG and CRM as one integrated capability can therefore expect better service delivery outcomes than banks that pursue them separately.

The study showed that operational efficiency has the greatest influence on CRM quality; improving the efficiency of internal processes, allocating resources efficiently, and enhancing credit-granting activities to improve delivery efficiency in the context of emerging risks have the greatest impact. At the same time, the results indicate that CRM

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positively and statistically significantly affects the efficiency of financial service delivery, but enhancing delivery efficiency alone is insufficient to meet the requirements of appropriate organizational conditions and strategies.

On the other hand, moderate ESG effects are also found, magnifying the effect of CRM on financial service delivery efficiency. ESG practices are not only vital for providing sustainable financial products but also bolster customer confidence and transparency while ensuring that delivery operations meet stakeholders' long-term expectations. This suggests that, to enhance the effectiveness of financial service delivery, internal operational competencies need to be integrated with a sustainable development focus in bank governance.

Theoretically, the study can be considered part of research on banking governance, as it recognizes banks as financial service distribution institutions rather than traditional financial intermediaries. At the same time, the research results add to the literature by demonstrating the complementary use of agency theory and stakeholder theory to explain organizational factors and sustainable orientations that affect distribution efficiency in the banking industry in emerging markets.

In practical terms, the research recommends that bank managers consider more efficient banking operations, improve the customer experience, and strengthen credit risk management. Moreover, embedding ESG in the governance and distribution of financial products will boost customer trust, reduce barriers to accessing responsible financial products, and improve operational efficiency. For policymakers, the findings support the State Bank of Vietnam's current policy direction: accelerating the full implementation of Basel II/III capital and risk-management standards, operationalizing the environmental risk management requirements for credit-granting activities under Circular 17/2022/TT-NHNN, expanding the green-credit taxonomy and related incentives, and strengthening mandatory ESG disclosure for listed banks. Embedding ESG criteria directly into credit appraisal and supervisory review processes would help translate the complementarity between ESG and CRM documented here into system-wide resilience in the financial services delivery system.

The research validates that the effectiveness of financial services delivery is the combined effect of governance, operational, and sustainable development factors rather than merely credit risk management capabilities and operational efficiency. An important limitation is that this study relies on cross-sectional, single-source survey data; the estimated relationships are therefore associational, causality cannot be established, and short-run dynamics cannot be separated from long-run dynamics. Future studies may include analyses based on time-series data or larger and different data sets to determine the specifics of changes and developments in financial services delivery systems in faster-changing emerging economies.

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